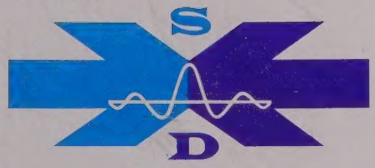
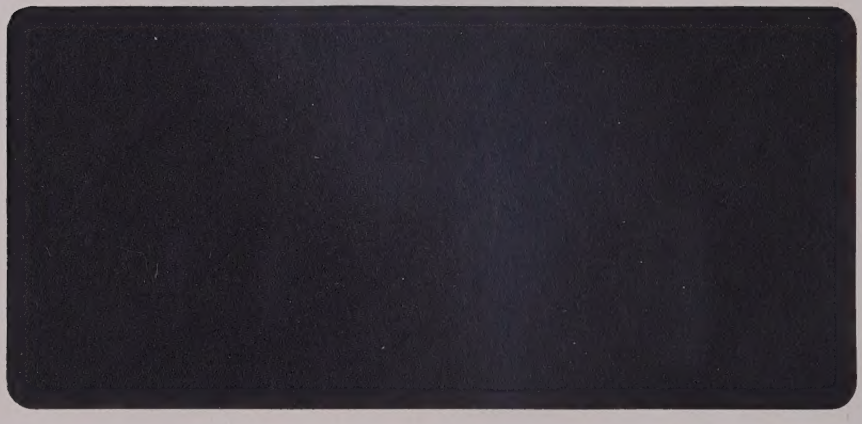
INSTRUCTION MANUAL
SD-11
CONSTANT OUTPUT LEVEL ADAPTER
C.O.L.A.



SPECTRAL DYNAMICS CORPORATION OF SAN DIEGO



SERIAL NO. 466

INSTRUCTION MANUAL
SD-11
CONSTANT OUTPUT LEVEL ADAPTER
C.O.L.A.

FOR UNITS BEGINNING WITH SERIAL NUMBER 174

SPECTRAL DYNAMICS CORPORATION OF SAN DIEGO

P. O. Box 671

San Diego, California 92112

Telephone: 714–278–2501

April 1, 1964

Revised
1 February 1966

Model SD-11 Constant Output Level Adapter

UNPACKING

The Model SD-11 Constant Output Level Adapter is shipped fully assembled in a carton which protects the instrument against all normal shipping hazards. To determine possible damage during shipment of the instrument, the procedures given below should be followed:

a. Inspect the exterior of the carton, making note of any visible damage.

b. Remove and retain all forms and invoices attached to the carton by the carrier.

c. Unseal the top portion of the carton and remove.

d. Remove instrument from the carton and inspect the exterior of the unit carefully, noting all visible damage.

e. The instrument may now be checked for functional operation by following the procedure outlined in Section II.

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be tested as soon as it is received. If it fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report forwarded to Spectral Dynamics Corporation of San Diego. The buyer will be advised of the disposition to be made of the equipment and arrangements shall be made for repair or replacement. Include Name, Model Number and Serial Number when referring to this instrument for any reason.

WARRANTY

Spectral Dynamics Corporation of San Diego warrants each instrument manufactured by them to be free from defects in material and workmanship for one year after delivery to the original purchaser. Our liability under this warranty is limited to servicing and adjusting the instrument returned to the factory with transportation charges prepaid by the purchaser. This warranty specifically excludes any liability in regard to electron tubes, batteries, fuses and lamps. If the fault or a portion thereof is determined by us to have been caused by misuse or abnormal conditions of operation, an estimate will be submitted to the purchaser prior to starting the work on the repairs.

If any fault develops, the following steps should be taken:

a. Notify Spectral Dynamics Corporation of San Diego giving full details of the problem, including name model and serial number of the equipment. Upon receipt of this information shipping instructions will be forwarded.

b. On receipt of shipping instructions, forward the instrument prepaid to the factory or authorized repair station indicated on the instructions.

SHIPPING

All shipments to the factory should be made via Air Freight. The instrument should be replaced in its original shipping carton or in a strong exterior container surrounded by two or three inches of excelsior or similar shock-absorbing material.

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SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION.

The Constant Output Level Adapter (C.O.L.A.) was developed to answer the needs of users of the B&K-type servo/cycling oscillators as an adapter that provides an auxiliary output from the B&K oscillator at a constant level for driving various types of auxiliary equipment systems. The C.O.L.A. adequately provides a constant output level for the following items of equipment:

a. Tracking Filter Analyzers (SD-101, SD-101 MK II, SD-101A, SD-1010 and SD-1012)

b. Frequency Counters

c. Frequency to DC Converters

d. Slip-Sync Systems

e. Reference Signals on Tape Recordings

f. Reference Signals on Oscillograph Recordings

g. Digital Frequency Encoders

h. Oscilloscope External Sync Signal

i. Phase Reference Signal

1-2. THEORY OF OPERATION.

The B&K vibration exciter control is a beat-frequency-type oscillator with a variable gain amplifier operating in series with one of the high frequency oscillators. In the servo mode of operation, the signal from a transducer is fed back into the variable gain amplifier. As the level from the vibration pick-up tends to change, the variable gain amplifier varies the output from one of the high frequency oscillators, causing the beat frequency output voltage to vary in such a manner as to hold the vibration signal level constant. Therefore, in the servo mode of operation, output level changes from the oscillator as high as 40 DB can be expected. During a vibration test, there are numerous auxiliary support equipment that require a source of relatively constant amplitude voltage, thus the C.O.L.A. was designed to fulfill this need.

The C.O.L.A. is a high input impedance demodulator, and when connected to the vibration exciter control, takes an output from each of the high frequency oscillators ahead of the variable gain amplifier, modulates them and passes the resulting beat frequency through a low pass filter, providing an additional output that is constant amplitude and at exactly the same frequency as the vibration exciter control output. Figure 1 presents the functional application of the C.O.L.A. as used in conjunction with the B&K Oscillator. Figure 2 provides a block diagram of the internal arrangements of the B&K Oscillator and of the C.O.L.A.

1-3. GENERAL DESCRIPTION.

The C.O.L.A. is packaged on a 3-1/2 IN. by 19 IN. standard panel with a chassis that extends 4 IN. behind the front panel. The following paragraphs provide the description and function of externally located controls and connectors. (See figure 3.)

C.O.L.A. Output Connectors

The OUTPUT connectors, located on both the front and rear of the unit, provide the constant level output from the C.O.L.A. The output impedance is less than 600 Ω in series with a four microfarad capacitor. The load should not be less than 10K ohms for best frequency response. The coupling capacitor should be removed if low impedance loads are to be driven.

Input 1 Connector

The output from the B&K high frequency variable oscillator is connected to INPUT 1. The input impedance is in excess of 10 megohms. The level supplied to INPUT 1 from the B&K should be between 18 and 40 volts peak to peak (6.4 and 14 volts RMS).

Input 2 Connector

The high frequency fixed oscillator output is connected to INPUT 2. The input impedance is in excess of 10 megohms. The level supplied to INPUT 2 from the B&K should be between 6 and 12 volts peak to peak (2.1 and 4.3 volts RMS).

Power Input Connector

A three-prong 115 VAC recessed connector is provided to supply input power to the SD-11 adapter. A power cord is furnished with the unit.

Power Switch

A two-position rotary switch, located on the front panel of the unit, controls 115 VAC line power, ON and OFF.

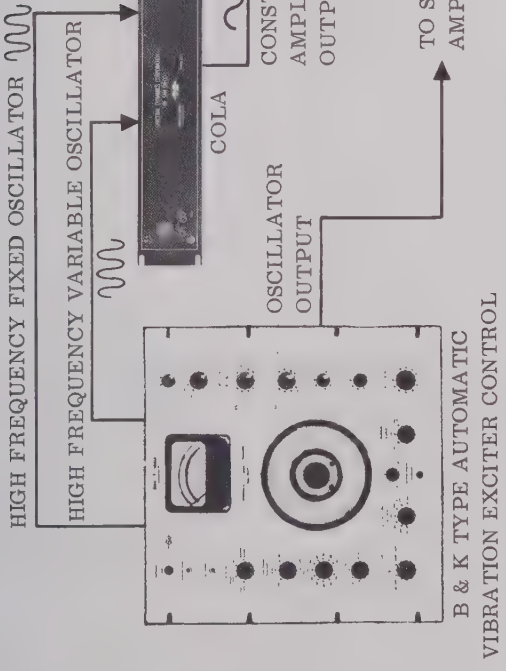


Figure 1. C.O.L.A. Application

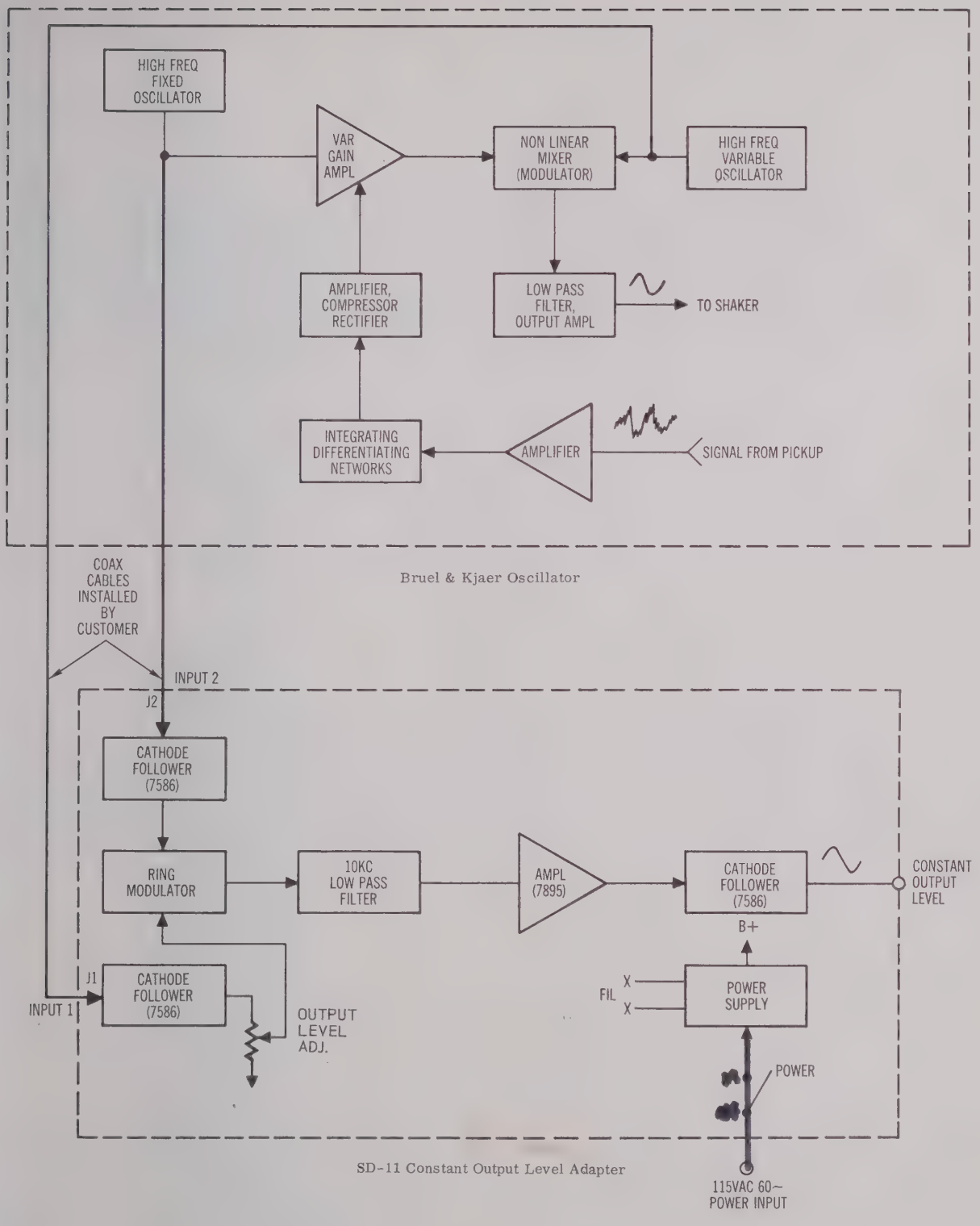


Figure 2. Block Diagram of the C.O.L.A. and Simplified Block Diagram of B&K

Figure 3. SD-11 Front and Rear Panel

Fuse

A 0.1 AMP, 3 AWG Slo Blow fuse is provided to assure protection of circuitry.

1-4. SPECIFICATIONS.

Output Level	Fixed at approximately 1 V (RMS)
Input Impedance	10 megohms
Output Impedance	Less than 600 ohms, in series with a 4 MFD capacitor
Output Frequency Response	±2% 5 CPS - 3 KC, ±5% 3 KC - 5 KC, down approximately 3 DB at 10 KC
Harmonic Distortion	Less than 3%
Input Frequency Range	Accepts two inputs of 25 KC to 100 KC with a frequency difference of no more than 10 KC. Wider frequency difference by special order
Input-Output Connectors	BNC rear connectors, banana jack binding post output on front panel
Power Requirements	~~105 - 125~~ 115/230 VAC, 50/60 CPS, 15 watts, approximately
Size	Standard rack panel, 3-1/2 IN. × 19 IN. Depth behind panel, 4 IN.
Shipping Weight	Approximately 7 pounds.

SECTION II

INSTALLATION AND OPERATION

2-1. INSTALLATION PROCEDURE.

NOTE

For all B&K models except 1019/1039. See Note 3 for B&K Model 1019/1039 installation instructions.

a. Remove rear cover of the B&K oscillator.

b. Select a mounting location for the C.O.L.A. in close proximity to the B&K in order to minimize coaxial cable lengths. Use RG 62U coaxial cable or equivalent.

c. Remove B&K bottom cover plate to expose tube sockets and components (figures 6 and 7).

d. Turn B&K ON and connect a frequency counter to the oscillator output.

e. Zero beat B&K in a normal manner at 60 CPS. The frequency counter should read 60 CPS.

f. Remove B&K power plug and install coaxial cable to fixed oscillator as shown in figure 7 and as presented schematically in figure 4a. Connect cable shield to nearest convenient ground point as shown in figure 7. Connect other end of cable to the C.O.L.A. INPUT 2. Turn the C.O.L.A. power ON.

g. Connect power to B&K and, by adjusting only the high frequency fixed oscillator adjustment (figure 7), zero beat the oscillator. Check frequency counter for a reading of 60 CPS.

h. Remove power from B&K and install cable to high frequency variable oscillator as shown in figure 7 and as presented schematically in figure 4b. Connect cable shield to nearest convenient ground point as shown in figure 7. Connect other end of cable to the C.O.L.A. INPUT 1.

i. Connect power to B&K and zero beat by adjusting front panel coarse and fine frequency adjustments. Check counter for 60 CPS reading. If insufficient range of the frequency controls is encountered, adjust variable oscillator coarse frequency control (figure 7).

j. Set the C.O.L.A. output voltage at 1.0 V RMS by adjusting R6 as necessary. (See figure 8.)

k. Re-install covers on B&K and the C.O.L.A.

l. Utilize the C.O.L.A.'s constant level output as required.

To remove the C.O.L.A. cabling from B&K, reverse the above procedure, being careful to remove only one cable at a time and zero beating oscillator after each operation and checking with a counter to be sure that the zero beat produced is 60 CPS. If difficulty is encountered during installation or removal of cabling, check frequency of fixed frequency oscillator across the cathode resistor of the fixed frequency oscillator tube and adjust to 30 KC using fixed oscillator frequency adjustment. Next, zero beat oscillator in normal manner at 60 CPS output.

NOTE 1:

The term "zero beating" the oscillator at 60 CPS refers to the following procedure utilizing the B&K:

1. Set oscillator frequency dial to 60 CPS.

2. Set METER SWITCH to power frequency beat.

3. Turn the "frequency scale adjustment" knob until the fluctuations on the meter become slower and finally almost cease. The fluctuations begin again when the critical point is passed. If the adjustment knob does not give satisfactory regulation, the screwdriver adjustment below the knob should be adjusted.

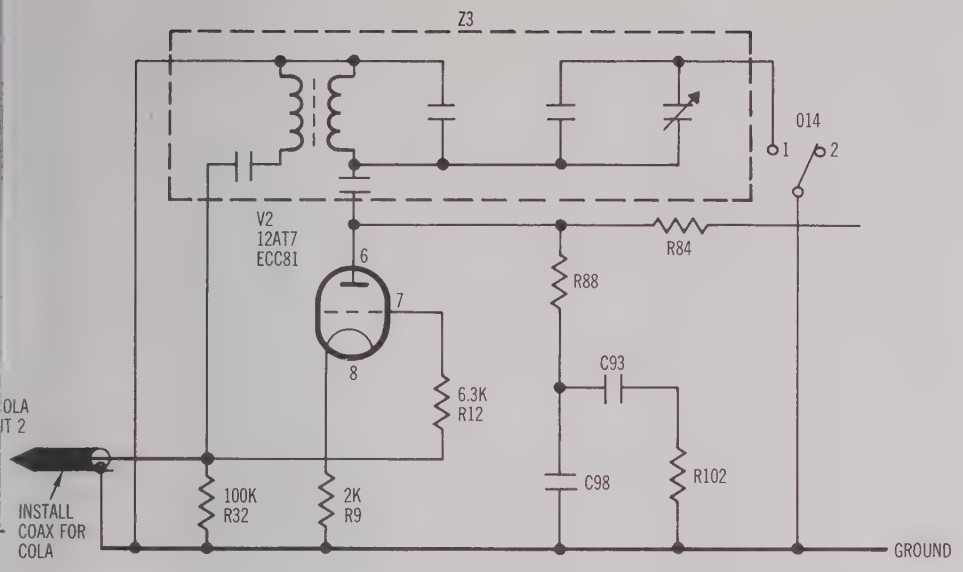
The above normal procedure can be found in the Operation Section of the B&K oscillator instruction book under "Calibration of Frequency Scale."

NOTE 2:

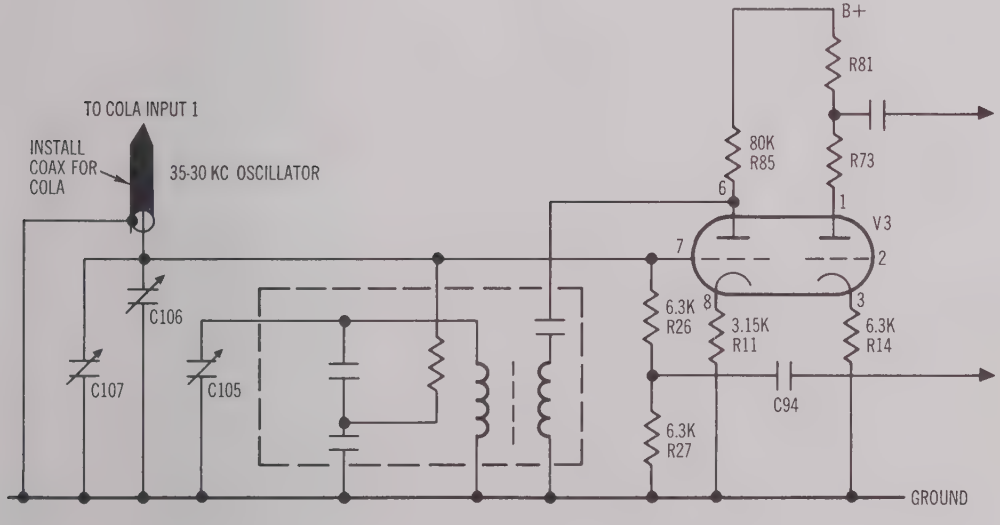
When connecting the C.O.L.A. to a Model 1016 B&K (figure 5a-b), it will be noted that the circuits for the fixed and variable high frequency oscillators are the same as for the Models 1018 and 1038, and only the tube type and "V" numbers differ. The same is generally true on the B&K Models 1014 and 1017. Any assistance required to install the C.O.L.A. in these other models, may be obtained from Spectral Dynamics Corporation of San Diego or its nearest representative.

NOTE 3:

Cathode follower outputs for the fixed and variable oscillators are provided at rear panel connectors on the B&K Model 1019/1039 oscillator. To use the C.O.L.A. with this model B&K, connect INPUT 1 of the C.O.L.A. to the B&K "25-30 kc/s" output, and INPUT 2 to the "30 kc/s and 35 kc/s" output. On both B&K connectors, pin 4 is the oscillator signal and pin 3 is chassis and circuit ground. Warm up the B&K and the C.O.L.A. for five minutes. Then set the C.O.L.A. output voltage at 1.0 V RMS by adjusting R6 as necessary (see figure 8). Replace the C.O.L.A. cover. Unit is now in service.

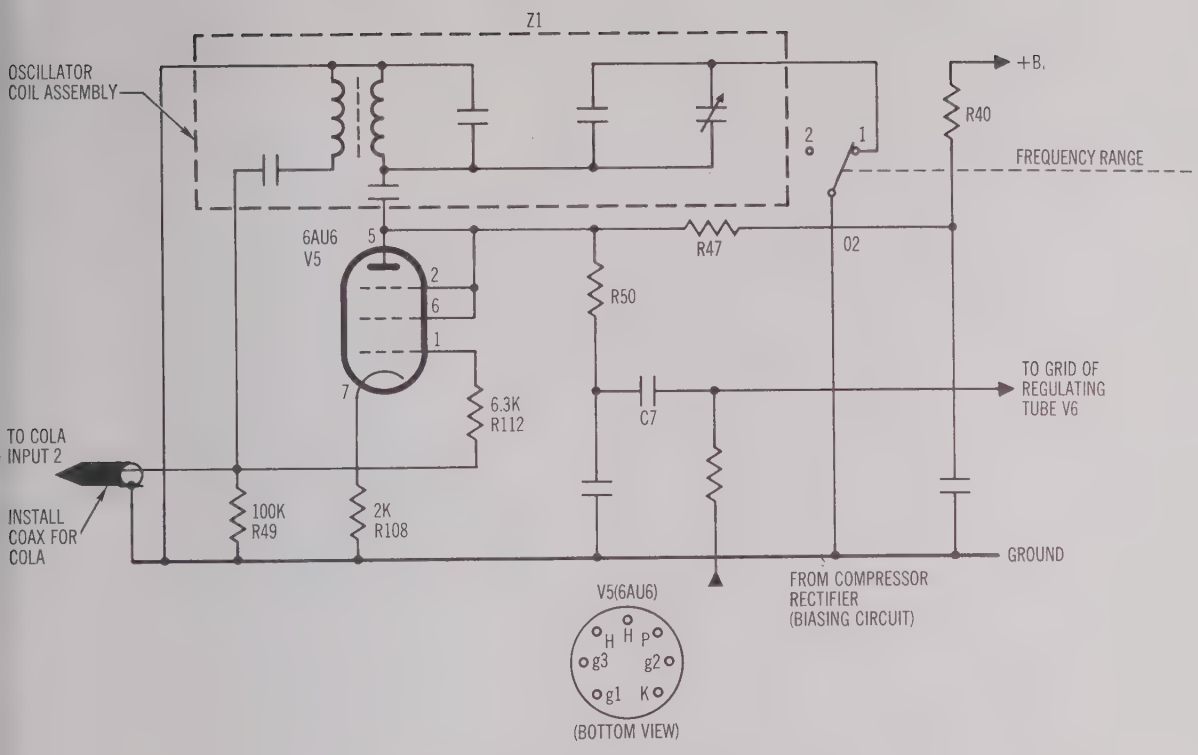


4a - B & K Fixed Oscillator Circuit (Models 1018 - 1038)

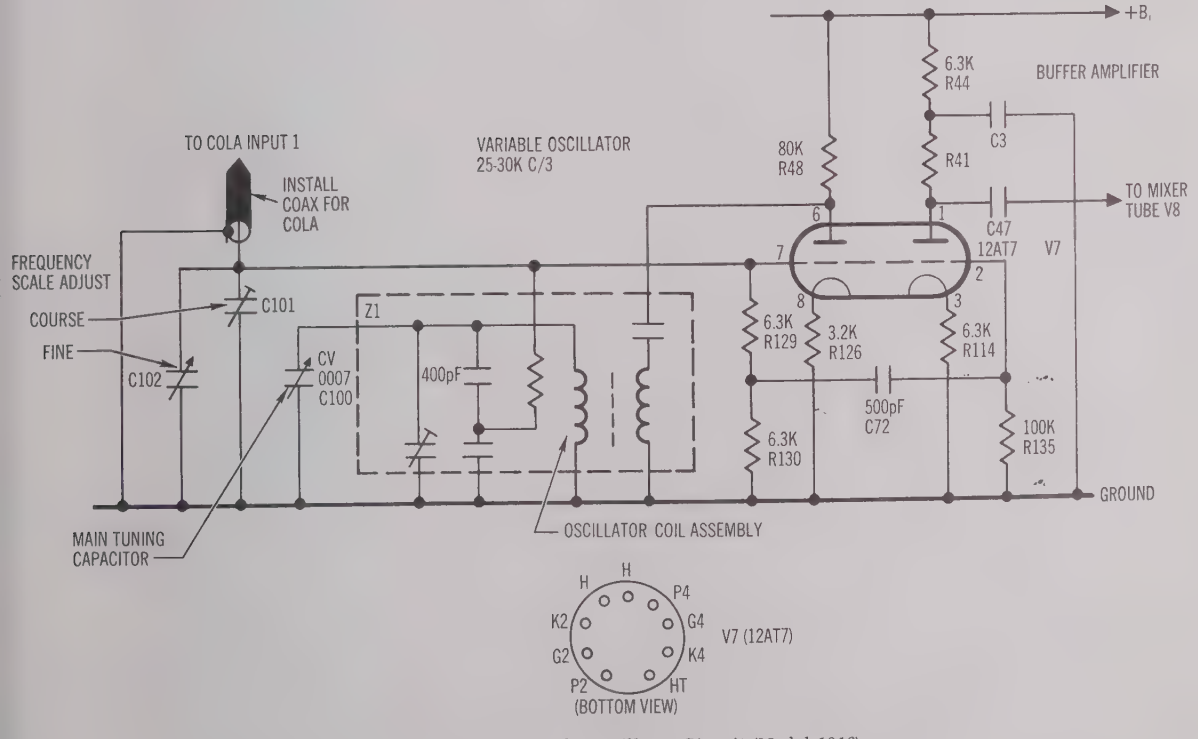


4b - B & K Variable Oscillator Circuit (Models 1018 - 1038)

Figure 4. Installation Schematic - B&K 1038 and 1018



5a - B & K Fixed Oscillator Circuit (Model 1016)



5b - B & K Variable Oscillator Circuit (Model 1016)

Figure 5. Installation Schematic - B&K 1016

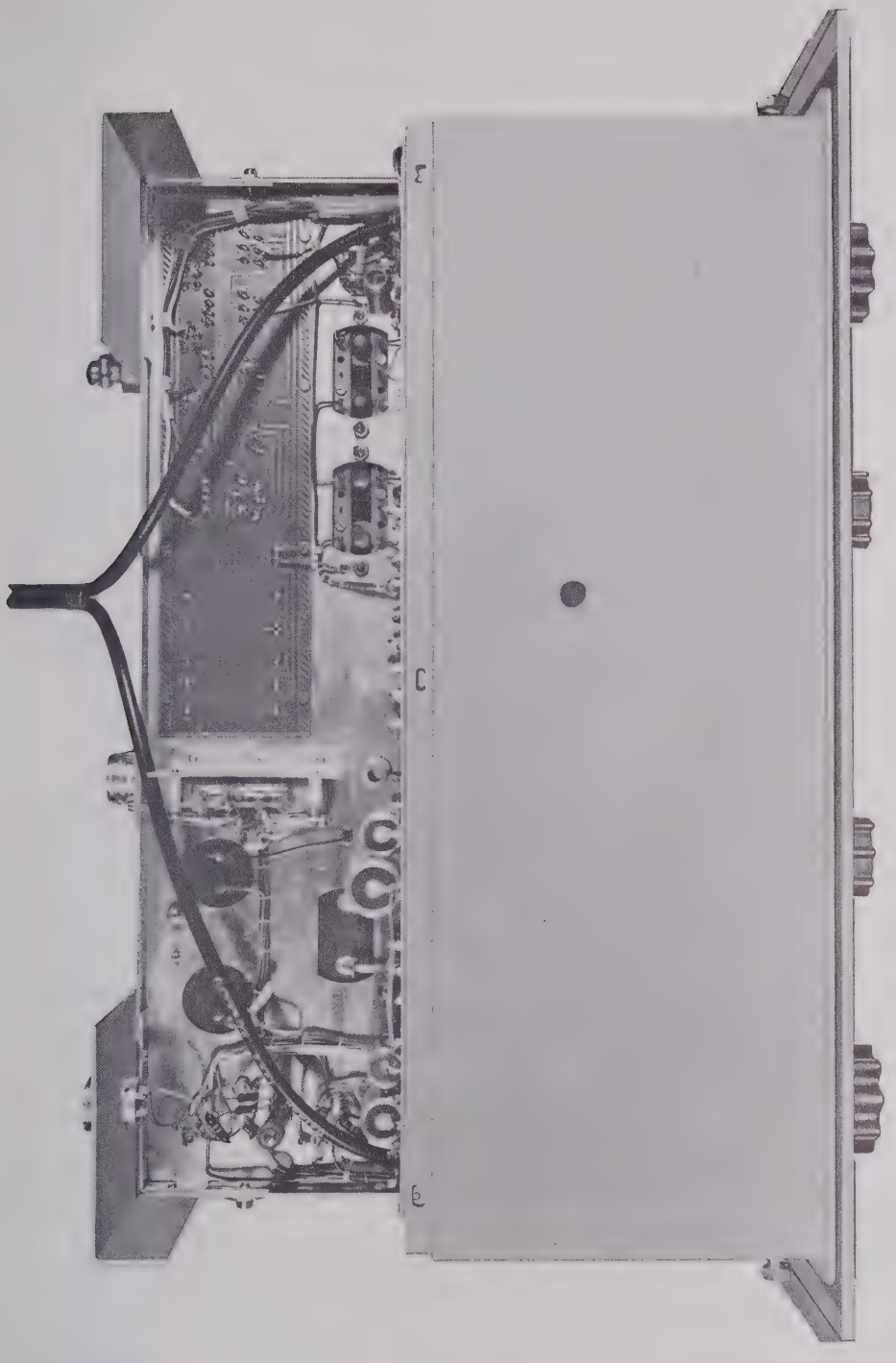


Figure 6. Bottom View of B&K Type 1018/1038 with Bottom Cover in Place

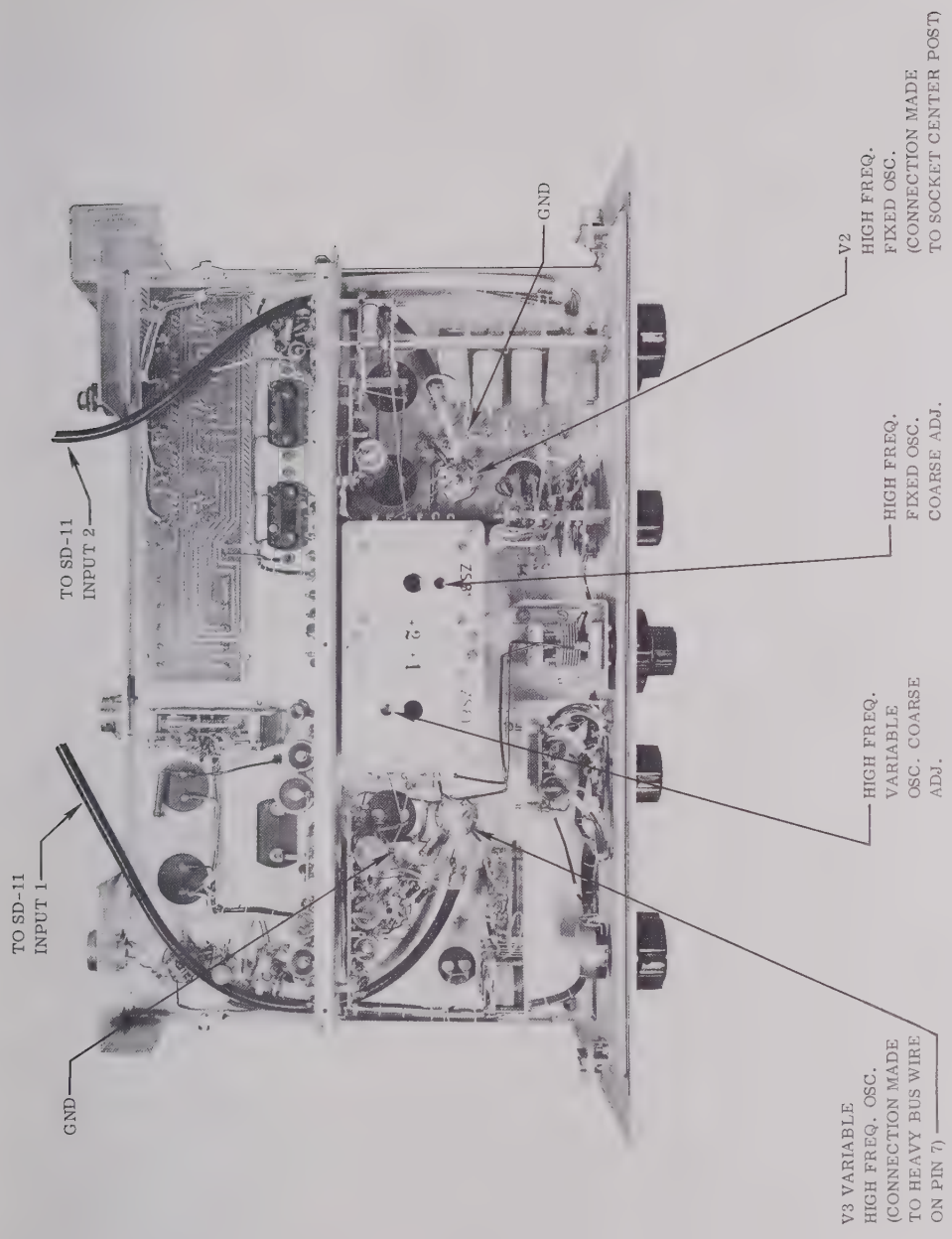


Figure 7. Bottom View of B&K Type 1018/1038 with Bottom Cover Removed

SECTION III

MAINTENANCE

3-1. GENERAL.

Generous derating of all components plus conservative circuit design enables the C.O.L.A. to perform reliably for long periods of time without maintenance or adjustment.

Tube failure is the most common cause of difficulty. Readjustment of R6, the output level control, may be required when replacing tubes. Otherwise, there are no adjustments to be made to any portion of the circuit when replacing components.

Voltages and waveforms shown on the schematic should be of assistance when troubleshooting the C.O.L.A.

Test signals for J1 (INPUT 1) and J2 (INPUT 2) may be provided by standard lab-type audio oscillators having sufficient output voltage and frequency range. To duplicate signal voltages from the B&K type 1016 or 1018 oscillator, the signal level at J1 should be approximately 40 volts peak to peak, and the input to J2 should be approximately 12 volts peak to peak. For the B&K type 1019 oscillator, J1 and J2 voltages should be approximately 20 and 7 volts peak to peak respectively.

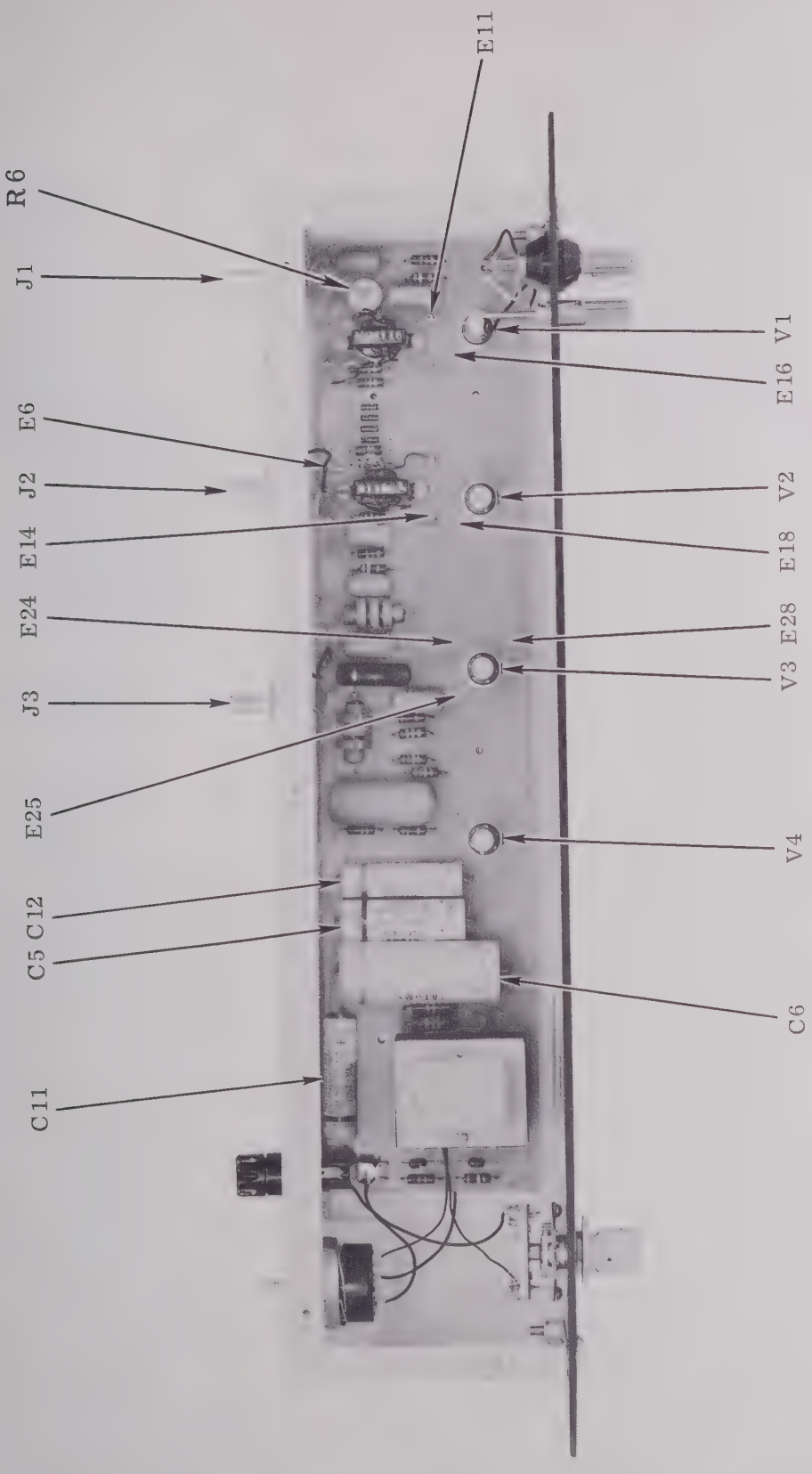


Figure 8. Bottom View of the C.O.L.A.

SECTION IV
PARTS LIST

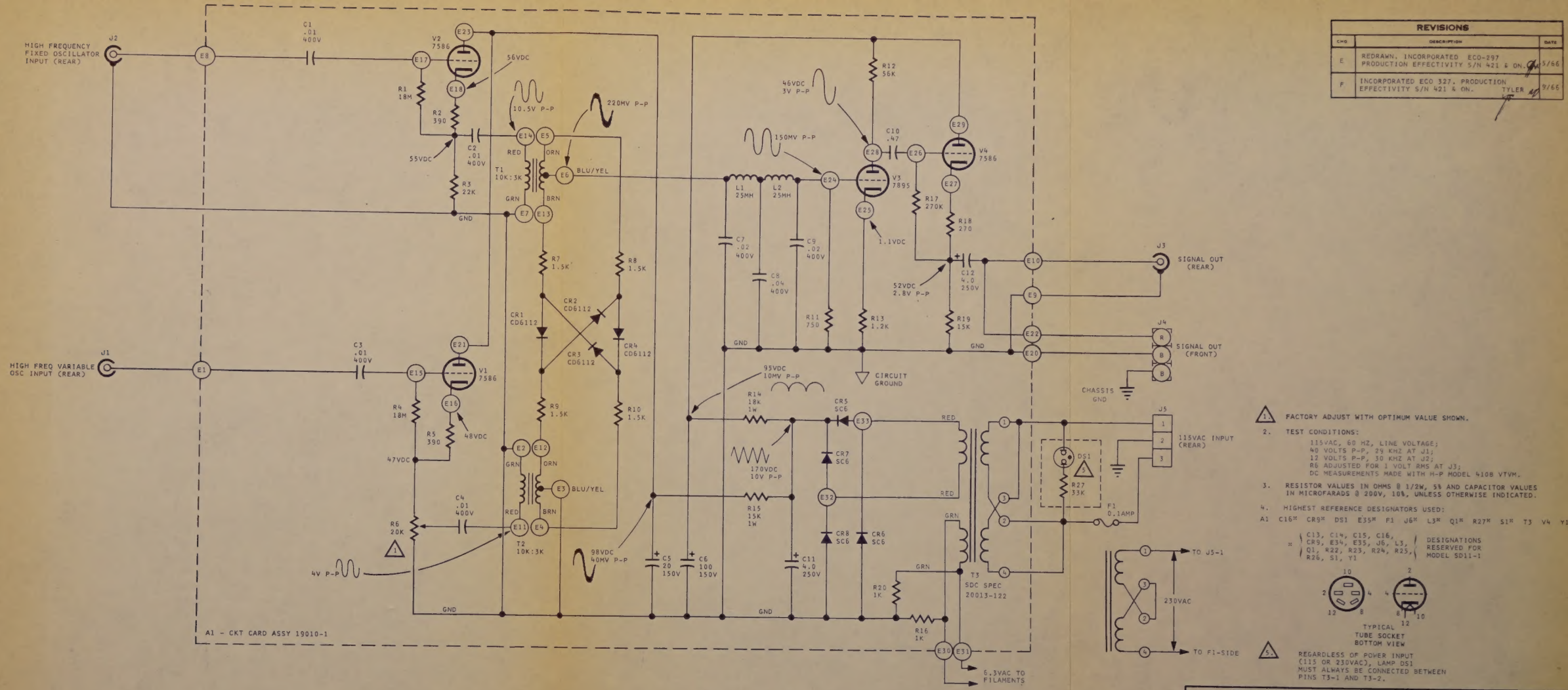
4-1. GENERAL.

With the exception of ~~two~~ 3 special transformers and a potentiometer, all parts used in the C.O.L.A. are normally available through local industrial electronics distributors. However, Spectral Dynamics Corporation of San Diego maintains a complete stock of all replacement parts for those customers desiring to order directly from our plant.

Orders for components should include a complete description of each part, along with the model and serial number of the C.O.L.A.

Special Components

REF. DES.	DESCRIPTION	SDC PART NO.
T1	Transformer	20013-067
T2	Transformer	20013-067
R6	Potentiometer, 20K	CTC350PC203A
T3	Transformer	20013-122



REVISIONS		
CHG	DESCRIPTION	DATE
E	REDRAWN. INCORPORATED ECO-297 PRODUCTION EFFECTIVITY S/N 421 & ON. TYLER	5/66
F	INCORPORATED ECO 327. PRODUCTION EFFECTIVITY S/N 421 & ON. TYLER	9/66

1. FACTORY ADJUST WITH OPTIMUM VALUE SHOWN.
2. TEST CONDITIONS:
   115VAC, 60 HZ, LINE VOLTAGE;
   40 VOLTS P-P, 29 KHZ AT J1;
   12 VOLTS P-P, 30 KHZ AT J2;
   R6 ADJUSTED FOR 1 VOLT RMS AT J3;
   DC MEASUREMENTS MADE WITH H-P MODEL 410B VTVM.
3. RESISTOR VALUES IN OHMS @ 1/2W, 5% AND CAPACITOR VALUES IN MICROFARADS @ 200V, 10%, UNLESS OTHERWISE INDICATED.
4. HIGHEST REFERENCE DESIGNATORS USED:
   A1 C16* CR9* DS1 E35* F1 J6* L3* Q1* R27* S1* T3 V4 Y1
   * C13, C14, C15, C16, CR9, E34, E35, J6, L3, Q1, R22, R23, R24, R25, R26, S1, Y1 — DESIGNATIONS RESERVED FOR MODEL SD11-1

TYPICAL TUBE SOCKET BOTTOM VIEW

5. REGARDLESS OF POWER INPUT (115 OR 230VAC), LAMP DS1 MUST ALWAYS BE CONNECTED BETWEEN PINS T3-1 AND T3-2.

SPECTRAL DYNAMICS CORPORATION OF SAN DIEGO

SCHEMATIC - MODEL SD11 & SD11L CONSTANT OUTPUT LEVEL ADAPTER

DRAWN TYLER
APPROVED
DATE 10 MAY 1966

19001 F

SHEET 1 OF 1